Universität Basel

SNI SWISS NANOSCIENCE INSTITUTE
EINE INITIATIVE DER UNIVERSITÄT BASEL UND DES KANTONS AARGAU

P1703 Quantum sensing of nanomechanical systems

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Nanoscale hybrid quantum systems hold great promise for future quantum technologies and fundamental studies of quantum physics. A prototypical hybrid quantum system consists of a single spin coupled to a harmonic oscillator.
In this project, we explore properties of individual spins trapped in the diamond crystal and coupled to diamond nano-mechanical oscillators through crystal strain. Our group has pioneered the development of these devices and the unique spin-oscillator coupling mechanism they exploit.

The goal of this project is to make a step-change in the performance of these devices by exploiting coherent, optical transitions in the spin-system to further enhance spin-oscillator coupling strengths. The ultimate goal of these experiments is to realise a fully coherent coupling between spin and oscillator (the “strong cooperatively regime”), where for example remote entanglement between spins could be readily achieved.
This project lies at the intersection of nano-physics, quantum-technologies ad fundamental solid state physics; it builds on skills in quantum optics, cryogenics and nanofabrication and requires a highly motivated candidate, ideally with a background in at least one of these domains.